



The  
Patent  
Office

PCT/GB 99 / 0 2 6 6 9

12 AUGUST 1999

INVESTOR IN PEOPLE

# 7

4

**PRIORITY  
DOCUMENT**  
SUBMITTED OR TRANSMITTED IN  
COMPLIANCE WITH RULE 17.1(a) OR (b)

The Patent Office  
Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ

GB99/2669

REC'D 22 SEP 1999

I, the undersigned, being an officer duly authorised in accordance with Section 94(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears a correction, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

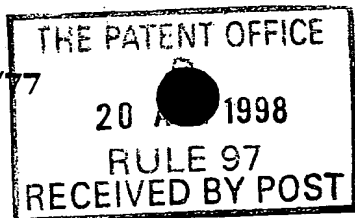
Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

Dated

16 AUG 1999





The Patent Office

20 AUG 1998

21AUG98 E384808-1 D02846  
P01/7700 25.00 - 9818184.5

# Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

9818184.5

The Patent Office

Cardiff Road  
Newport  
Gwent NP9 1RH

1. Your reference

PLB/CC/N476

2. Patent application number

(The Patent Office will fill in this part)

3. Full name, address and postcode of the or of each applicant (underline all surnames)

COMODO TECHNOLOGY  
DEVELOPMENT LIMITED

UNDERSHAW GLOBAL LIMITED  
TRIDENT CHAMBERS

PO BOX 146  
WICKHAMS CAY  
ROAD TOWN

07594237001

07491730001

Patents ADP number (if you know it)

THE FOND, 3 CITY AVE  
HALIFAX

TORTOLA

BRITISH VIRGIN ISLANDS

If the applicant is a corporate body, give the country/state of its incorporation

H X 5 5LE  
UK

BRITISH VIRGIN ISLANDS

4. Title of the invention

IMPROVEMENTS IN AND RELATING TO DATA PROCESSING  
APPARATUS AND VERIFICATION METHODS

5. Name of your agent (if you have one)

APPLEYARD LEES

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

15 CLARE ROAD  
HALIFAX  
WEST YORKSHIRE  
HX1 2HY

Patents ADP number (if you know it)

AA005 190001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

YES

a) any applicant named in part 3 is not an inventor, or

b) there is an inventor who is not named as an applicant, or

c) any named applicant is a corporate body.

See note (d))

## Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description 9 x 2

Claim(s)

Abstract

Drawing(s) 1 x 1

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents  
(please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature

*Arthurd Lee*

Date

AUGUST 1998

12. Name and daytime telephone number of person to contact in the United Kingdom

PAUL BRANDON  
0161 228 0903

### Warning

*After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.*

### Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.*
- Write your answers in capital letters using black ink or you may type them.*
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.*
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.*
- Once you have filled in the form you must remember to sign and date it.*
- For details of the fee and ways to pay please contact the Patent Office.*

IMPROVEMENTS IN AND RELATING TO DATA PROCESSING  
APPARATUS AND VERIFICATION METHODS

Field of the Invention

5

The present invention relates to data processing apparatus and to verification methods.

Background to the Invention

10

Despite the growing proliferation of computer hardware and software, there are still serious problems associated with data entry, and security of both hardware and software. Many new problems have arisen and others have become exacerbated as more and more computers are networked together and linked to the internet. One particular problem is that of remote hacking in which an unauthorised user seeks access to a computer system by accessing the system otherwise than through a local keyboard or other local peripheral input device.

20

The present invention aims to provide in preferred embodiments thereof, data processing apparatus and verification methods that address at least one of these problems.

25

Summary of the Invention

According to the present invention in a first aspect, there is provided in a data processing apparatus comprising a first input channel and a second input channel each for inputting signals, a security device for verifying a password, and means for determining whether the password input to the security device comes from the second input channel, in which the security device will

35

verify a correct password from the first input channel,  
but not from the second input channel, in which the  
security device is configured to receive signals from the  
first input channel and configured not to receive signals  
5 from the second input channel.

10 In this way, the device determines whether the  
password input thereto comes from the second input  
channel, ie it physically cannot come from this channel.

Suitably, the device receives signals only from the  
first input channel. Suitably, the device cannot receive  
signals from the second input channel.

15 Suitably, the apparatus further comprises means to  
determine whether the security device has verified the  
password and, if not, to vary operation of the apparatus.  
Normally, the variation will be a restriction in  
operation, typically it will render the apparatus  
20 unusable.

Suitably, the first input channel comprises a first  
peripheral input device. Suitably, the first peripheral  
input device comprises a keyboard and the security device  
25 is located to receive signals from the keyboard and  
transmit them to a keyboard controller or to a bus.  
Suitably, the device is located between the keyboard  
controller and the keyboard bus. Here, "between" is in  
the electronic sense, ie receives output from the keyboard  
30 controller and generates an input for the keyboard bus.  
The device thus acts as an interface between the keyboard  
controller and the bus.

Suitably, the apparatus further comprises a control  
35 unit (such as a CPU) which interrogates the security

device to determine whether a correct password has been entered. A password protected operation is performed only if the control unit receives such verification.

5        Suitably, the device encrypts all signals it receives. Suitably, a decryption tool is provided between the output of the device and the application to which they key presses comprise instructions.

10        According to the present invention in a second aspect, there is provided a method of verifying which of a first input channel and a second input channel is used in data processing apparatus, the method comprising the steps of upon input of a password to the apparatus, a  
15        security device receiving input from the first input channel not from the second input channel declining password authorisation, if the input is through the second input channel, and if the correct password is input through the first input channel providing a password  
20        verification.

      Suitably, the method includes the step of determining whether the security device has verified the password and, if not, varying the operation of the apparatus. Normally,  
25        the variation will be a restriction in operation. Typically, it will render the apparatus unusable.

      Suitably, a control unit (such as a CPU) interrogates the security device to determine whether the correct  
30        password has been entered.

      Suitably, the method includes the step of receiving signals only from the first input channel. Suitably, the data processing apparatus includes a device for receiving

signals. Suitably, the device cannot receive signals from the second input channel.

Suitably, the first input channel comprises a first  
5 peripheral input device. Suitably, the first peripheral  
input device comprises a keyboard and the security device  
is located to receive signals from the keyboard and  
transmit them to a keyboard controller or to a bus.  
Suitably, the device is located between the keyboard  
10 controller and the keyboard bus. Here, "between" is in  
the electronic sense, ie receives output from the keyboard  
controller and generates an input for the keyboard bus.  
The device thus acts as an interface between the keyboard  
controller and the bus.

15  
Suitably, the apparatus further comprises a control  
unit (such as a CPU) which interrogates the security  
device to determine whether a correct password has been  
entered. A password protected operation is performed only  
20 if the control unit receives such verification.

#### Brief Description of the Figure

25 The present invention will now be described, by way  
of example only, with reference to the Figure that follows  
which is a schematic illustration of an electronic data  
processing apparatus embodying the present invention.

#### Description of the Preferred Embodiments

30  
In one preferred embodiment of the present invention,  
there is provided an electronic data processing apparatus,  
typically a personal computer ("PC") 2. The PC 2 receives  
input signals from peripheral input devices (eg keyboard,  
35 data socket, pen, voice recognition microphone etc). The



PC includes a keyboard 4 having an associated bus 6 and a keyboard controller 8 forming a first input channel from the keyboard. The PC 2 also has at least one further input channel 10 for signals corresponding to those from the keyboard. Typically, this further input channel 10 will comprise a data socket for receipt of digital signals transmitted from a remote modem. The PC 2 generally treats signals received via the data socket in the same way as those received from the keyboard, except as set out below.

A security device 12 is located between the keyboard controller 8 and the bus 6. That is, the security device 12 is located to receive signals from the first input channel (the keyboard 4), but not from the further input channel (the data socket 10). The security device 12 has the following characteristics.

- (i) It includes a fast and reversible encryption/decryption algorithm such as DES or T-code.
- (ii) It has a volatile memory Random Access Memory (RAM) including authorisation codes or an algorithm therefor, or pre-stored password and means for checking whether an input password or code matches such an authorisation code or password.
- (iii) It includes a real-time clock powered by a power supply.

The security device 12 is typically embodied in a board (not shown) including a microprocessor. The board

may be integral to the PC 2 or be a separate plug-in board.

5       The security device 12 requires a password to be  
input to pass keyboard signals to the bus 8. If the  
password is not provided on demand (a limited number of  
tries may be permitted before a lock-out) the security  
device 12 will either block signals or vary them, for  
instance by encryption, to be unusable. The security  
10    device 12 is configured so that upon receipt of the  
correct password it is activated for a predetermined  
period of time, according to the in-built real-time clock.  
The period of time can be varied based upon the password  
or other authorisation received. While activated, the  
15    security device 12 transmits keyboard signals unaltered.  
When not activated it is in the encryption state and  
encrypts signals passing therethrough (or may block them).  
Thus, while in the encryption state the central processing  
unit ("CPU") of PC 2 cannot understand the output of  
20    keyboard 8.

      The security device 12 when activated and authorised  
receives input signals from the keyboard bus and outputs  
them to the keyboard controller. The delay is  
25    insignificant.

      In use, the PC 2 is configured to require a password  
before permitting access to certain functions or data  
(which may be all functions and/or data). By way of  
30    example, a word-processing file may be password protected.  
Before permitting access to the file, the PC CPU requires  
confirmation from the security device 12 that the correct  
password has been entered. Only if the CPU receives  
verification from the security device that the correct  
35    password has been entered will it perform the password

protected operation. Since the security device 12 can only receive inputs from the keyboard, it is not possible to enter the password from any other source.

5 In this way, it is possible to verify the physical presence of a user. If signals are input to the PC via a modem, for instance from a "hacker", it will not be received via the keyboard input channel and so the password cannot be verified. Thus access can be denied to  
10 remote users or additional security measures put in place before allowing them access.

Typically, data will be encrypted and decryption will only be permitted upon verification from the security  
15 device 12.

Preferred embodiments of the present invention also enable a security enhancement to be provided to prevent "key logging" attacks. This is where a hacker loads a  
20 short application on to a PC to be attached which application interrogates the operating system to determine each keystroke as it is pressed. A record of keystrokes can be used to inspect confidential information and/or retrieve passwords.

25 To prevent this the security device 12 can be set to encrypt all key presses according to a predetermined encryption algorithm. An encryption algorithm is used to ensure that generally a given key press when repeated does  
30 not generate as an output from the security device 12 the same output. A tool is additionally provided between the operating system and the application to be controlled by the key presses to decrypt the encrypted key press data. Therefore since the key press information available to the

operating system is encrypted it is of no use to a key logger.

5        Although reference is made herein to a "password",  
that can comprise any signal or combination of signals and  
need not be a "word" at all.

10       Clearly, in certain embodiments the apparatus may  
only verify input from other inputs, usually being  
peripheral input devices.

15       The reader's attention is directed to all papers  
and documents which are filed concurrently with or  
previous to this specification in connection with this  
application and which are open to public inspection with  
this specification, and the contents of all such papers  
and documents are incorporated herein by reference.

20       All of the features disclosed in this specification  
(including any accompanying claims, abstract and  
drawings), and/or all of the steps of any method or  
process so disclosed, may be combined in any combination,  
except combinations where at least some of such features  
and/or steps are mutually exclusive.

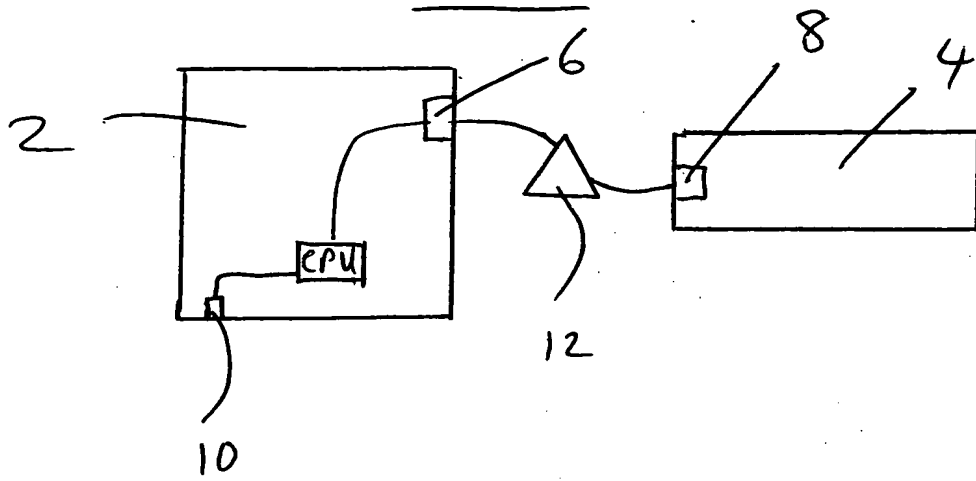
25       Each feature disclosed in this specification  
(including any accompanying claims, abstract and  
drawings), may be replaced by alternative features serving  
the same, equivalent or similar purpose, unless expressly  
30       stated otherwise. Thus, unless expressly stated  
otherwise, each feature disclosed is one example only of  
a generic series of equivalent or similar features.

35       The invention is not restricted to the details of the  
foregoing embodiment(s). The invention extends to any

novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any  
5 method or process so disclosed.

**THIS PAGE BLANK (USPTO)**

Fig 1



**THIS PAGE BLANK (USPTO)**





7

8



4

12

**THIS PAGE BLANK (USPTO)**